Maine Field Station, Orono, ME

1) Most Recent Evaluation of the Lab - None available

2) Brief History and Mission

The NEFSC Maine Field Station was established in 1990 in Orono, ME and is a component of the Population Dynamics Branch of the Woods Hole Laboratory.

The NEFSC has a relatively long history of involvement with Atlantic salmon that paralleled the development of the International Counsel for Exploration of Sea Working Group on North Atlantic Salmon (WGNAS) in 1979 and has been providing scientific advice through WGNAS to the North Atlantic Salmon Conservation Organization (NASCO) since it was established in 1983. The early years of the Atlantic salmon Program followed the primary objectives of NASCO- contributing to the conservation, restoration, enhancement, and rational management of salmon stocks. While this was an international venue for stock assessment, the role of the NEFSC focused on US populations to provide information on fisheries and catches; status of stocks; projected abundance; conservation requirements; and catch appropriate to meet these conservation requirements. Starting in 1990, the program began a long-term cooperative agreement with the State of Maine's Atlantic Salmon Commission to improve freshwater stock assessments. This partnership was fostered by international concerns that US rivers were no longer capable of producing wild Atlantic salmon.

This began work on the assessment of the biodiversity of Atlantic salmon stocks in Maine. These assessments proved that Atlantic salmon production in Maine was occurring and that freshwater abundance of parr was similar to populations in many Canadian rivers. Recovery of these populations has been slow and adult abundance has declined from previously historic lows. Downward population trends in US rivers during the 1990's are similar to those throughout the range of Atlantic salmon in North America but affected already depressed populations. In 2000, the Atlantic salmon program became the Atlantic Salmon Research and Conservation Task (ASRCT) and consolidated all center personnel working on Atlantic salmon under one group. In addition, to improve partnerships with other groups in Maine, the Maine Field Station was opened in Orono, Maine close to University of Maine and Maine Atlantic Salmon Commission research offices. This move has helped foster both research and management partnerships with these groups and task leadership at the MFS integrates science programs in Woods Hole and Narragansett labs of the NEFSC into these partnerships in Maine.

The vision statement of ASRCT is shared with Northeast Regional Office salmon staff as part of the North East Salmon Team (NEST) and is to recover and maintain naturally reproducing Atlantic salmon populations and their ecosystems to provide a surplus for fisheries consistent with existing laws. NEST mission is to identify, quantify, and minimize threats to Atlantic salmon; conserve and enhance habitat; and evaluate our progress toward recovery by assessing the viability of these populations at critical life history stages. NEST will accomplish our mission through a coordinated program that fully integrates science and management within NMFS and effectively partners with Federal, State, and Private organizations.

3) Major Customers

USFWS; US Forest Service; academic institutions; and international organizations such as the North Atlantic Fishery Organization (NAFO); the International Council for the Exploration of the Sea (ICES); and the North Atlantic Salmon Conservation Organization (NASCO): Resource and fishery information is provided to several management agencies including ICES and NAFO.

Maine Atlantic Salmon Commission: Receives financial support (>85% of ASC annual budget) through an annual cooperative agreement that has been in place since 1990. In addition, partnership with ASC is extremely effective with each agency working on their strengths to deliver annual state, federal, and international assessments of status of Atlantic salmon stocks.

University of Maine systems: With the ASRCT supporting research on population differentiation, evolutionary ecology, ocean environments, and genetic tracking studies with 3 campuses. In addition, ASRCT staff serves on several university graduate committees as well as Sea Grant Policy Advisory Committee.

USFWS hatchery facilities: Partnerships are strong with an integrated assessment of marine survival through a massive marking program that uses visual implant elastomer tags and is the largest marking program of its kind. This allows ASRCT to assess marine survival of hatchery products providing an unbiased external assessment of hatchery products to both FWS and the international assessment community (NASWG and NASCO).

Conservation groups large (Trout Unlimited and Atlantic Salmon Federation) and small (Sheepscot Valley Conservation Association): These groups rely on data and information from annual assessments to target their conservation programs that conserve both salmon and their habitat.

General Public: The ASRCT has a high level of interaction with the public and is frequently asked to speak to watershed councils, fishing clubs, and other conservation organizations. Outreach is an important element of achieving our goal and outreach products include information dissemination through news releases, interviews for radio and television, as well as participation in outreach kiosks within each watershed.

4) Research Summary

The Center and Region have a unified approach to Atlantic salmon conservation that has four primary objectives. They are to: 1) identify and quantify the threats to Atlantic salmon; 2) identify and conserve Atlantic salmon habitat; 3) assess the current status of Atlantic salmon populations; and 4) formulate, implement, and evaluate recovery strategies. While our program broadly supports restoration activities throughout New England with marine and distant-water fisheries assessments, the primary focus of our assessment activities are the populations of the GOM-DPS and Penobscot River. Our focus on these populations is consistent with NOAA Fisheries efforts to support the recovery of endangered stocks and also to support the recovery of the largest Atlantic salmon population in US waters. Within each objective, we have identified mission-essential tasks that support each objective and provide the scientific and management products needed. Nested in this hierarchical structure are 14 mission-essential tasks that the science center focuses its efforts upon. These are: 1) understanding trophic interactions involving Atlantic salmon; 2) describe, delineate, conserve and enhance Atlantic salmon habitat;

3) Gulf of Maine and estuarine smolt migration monitoring; 4) distribution and ecology of post-smolt and marine-phase Atlantic salmon; 5) conduct review of other rivers to determine DPS status and conservation status; 6) smolt assessments and biological sampling; 7) marine growth and survival monitoring; 8) Atlantic salmon stock assessments and projections; 9) improving precision of freshwater Atlantic salmon assessments; 10) scale image analysis and digital aging; 11) facilitate and assess alternative stocking techniques; 12) intra- and inter-agency coordination; 13) understanding and conserving Atlantic salmon biodiversity; and 14) wild fish health assessment and research. Additional details on some of these programs follows.

Gulf of Maine and Estuarine Smolt Migration Monitoring: The emigration of Atlantic salmon smolts from Gulf of Maine Rivers occurs from April through June. This transition can be a period of stress for these fish as they migrate through lower reaches of river systems and contend with physiological challenges and new predators upon entering the estuarine and marine environment. This job uses ultrasonic telemetry studies to monitor migration ecology and provides estimates of mortality through discrete ecological zones: riverine, estuarine, nearshore and Gulf of Maine. These data also provide insights into influences of environment on migration routes and speed as well as transitional ecology. The four year Narraguagus Bay study features an array that extends into the Maine Coastal Current of the Gulf of Maine (2002-2005). The Cobscook Bay study monitors the survival of smolts from the Dennys River system (2001-2004). This study is also integrated with work of Canadian researchers allowing tracking of smolts in US and Canadian waters and expanding spatial coverage into the head of the Bay of Fundy. In addition to telemetry work, this job also investigates environmental effects on smolt emigration though studies of the effects freshwater factors on physiological readiness of smolts and modeling of the flow and salinity dynamics of estuarine systems.

Distribution and Ecology of Post-smolt and Marine-Phase Atlantic Salmon: It is currently hypothesized that an important component of mortality in marine habitats occurs during or soon after the transition from freshwater to saltwater environments. Sampling of Atlantic salmon smolts in estuarine and nearshore marine environments has been identified as a research priority by Canadian DFO and NASCO. To sample Atlantic salmon post-smolts, we implement a post-smolt trawling program from mid-May until June to estimate the spatial distribution and physiological condition of Atlantic salmon post-smolts in Penobscot Bay and the Gulf of Maine. Beyond these trawls, encounters of Atlantic salmon at sea in domestic commercial fisheries are rare and the next sampling opportunity for these fish typically occurs in West Greenland fisheries. We coordinate and implement fisheries sampling programs in Greenland. This international effort characterizes the size composition, age composition, and continent-of-origin of salmon in this fishery. NEFSC investigators are active participant in field sampling in West Greenland, and contract to complete genetic analyses needed to estimate continent of origin of the catch

Smolt Assessments and Biological Sampling: The ASRCT is committed to an active field assessment and research program to enumerate smolts emigrating from several rivers in Maine. Past work has indicated that accurate counts of smolts can be made and sampling mortality is negligible. These assessment programs provide critical data to assess the health of these stocks for an entire watershed and provide a platform for tagging and telemetry projects to better understand the ecology of Atlantic salmon in marine ecosystems. These assessments use

primarily rotary screw traps and population estimates are made through stratified mark-recapture methods or Catch per Unit Effort/discharge relationships. Trapping operations this year will continue in the Narraguagus and Pleasant Rivers. Planning to reinitiate the Sheepscot River monitoring program will be conducted this year. Goals of these assessments are to estimate abundance and run timing, and collect biological information including tissue for genetic studies and scales to determine age and growth.

Atlantic Salmon Stock Assessments and Projections: The United States has been an active participant in both the national and international stock assessment and management processes for Atlantic salmon. As the lead agency in these efforts, NOAA Fisheries provides data inputs and scientific expertise to promote the production of high quality stock assessments. This job entails full participation and leadership within the US Atlantic Salmon Assessment Committee and the ICES Working Group on North Atlantic Salmon. Assessment of current status and projections of future abundances are required for both the DPS, for recovery planning, and all US stocks, for providing guidance on interception fisheries. To directly collect data on fisheries, the US sends samplers to Greenland annually and leads coordination of international efforts. In addition, NOAA Fisheries coordinates genetic continent-of-origin analysis of representative samples of this fishery with USGS geneticists to determine the proportion of North American origin fish in this population. This job element utilizes a population viability analysis developed by NMFS to aid recovery planning for the DPS. This job element also conducts and develops novel methods of stock assessment modeling in support of management authorities to develop and refine estimates of pre-fishery abundance for the West Greenland and other fisheries potentially exploiting US stocks.

5) Major Accomplishments in the Last 5 Years

On a sustained basis, the ASRCT produces annual assessments on Status of Atlantic Salmon Populations in Maine and contributes to the Annual US Atlantic Salmon Assessment Committee and NASWG assessments at a national and international level. The team also produces numerous working papers for the Maine Technical Advisory Committee; US Atlantic Salmon Assessment Committee; and North Atlantic Salmon Conservation Organization (NASCO) in addition to peer-reviewed publications and professional presentations. Highlights over the past 5 years are:

- Completion of comprehensive Population Viability Analysis model for Maine Atlantic salmon.
- Preliminary development of a region-of-origin analysis in ICES salmon assessment that formalizes partitioning of US and Canada fish.
- Expansion of post-smolt trawl spatial coverage and physiological sampling.

6) Legal Mandates

Activities of the ASRCT and the Maine Field Station focus on Protected Species Recovery and Anadromous Fish Conservation act activities as well as international mandates for information from NASCO.

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